Methods for Close-Up Photographs

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There are numerous methods for taking close-up photographs. Many cameras will have a telephoto or macro mode which allows you to take close-ups. However, if you want to get really close and take photos of objects less than an inch in size, you will probably need to modify your lens system and use computer software to enhance your photographs. Brief descriptions of various techniques for taking close-up photos of small objects are listed below. A bibliography is also provided so you can get more details on each technique.

Modification of Lens Systems

Your camera will focus closer if the distance of your lens is moved further away from the camera body. There are several ways to do this.

Macro lenses are available that have built-in extensions and lens systems to correct for lens aberrations that occur when focusing very closely. These lenses provide excellent photographs for thumbnail-size objects. The drawback to these lenses is that they are expensive.

Extension tubes are cheaper, and you can even make your own from common household materials. Your camera is attached to one end of the tube, and your lens is attached to the other end.

Bellows are a fancier version of extension tubes. The bellows provides an adjustable extension. This approach is more expensive than extension tubes and more difficult to use in the field. However if set up properly, bellows systems can take photographs of objects as small as one millimeter.

Additional lenses can be added to your camera to allow it to focus more closely.

Close-up lenses can be purchased to attach to your existing lens. Typically these close-up attachments range from 2x to 4x. Cheaper close-up lenses are usually of poor quality and are avoided by most photographers.

Reversed lenses can also be added to your existing lens to increase magnification. Basically, a normal lens is reversed and attached to your camera. This does not work with all lenses. For example, macro lenses will not work this way.

Microscopes are another approach for taking extremely small photographs. The camera is attached to the microscope with an adapter. This is a more expensive approach than a bellows, but it may be an option if you already have a microscope.

Computer Software

Many types of software are used for processing photographs. *Photoshop* is probably the most well known, but it is very expensive. *Photoshop Elements* is a cheaper version of *Photoshop* made specifically for photography. *Photoshop Elements* is really all you need for processing photographs. In addition to general photo processing software, specialized software is used to merge multiple photographs to correct for depth-of-field problems.

General photographic processing provides methods for modifying contrast, brightness, sharpness, color, etc. Cropping allows you to electronically magnify an object by cutting out a smaller portion of a photo and increasing the size to the original photo. This will reduce resolution. Using cameras with 5 megapixels or higher will allow cropping while still maintaining good resolution.

Specialized software for merging photographs is available to eliminate the out-of-focus portions of close-up photos. The best way to see how this works is to look at the examples on the Internet.

Bibliography

The above descriptions are too brief to really understand all the available techniques for close-up photography. You can learn more by searching the Internet for "micro photography" and "macro photography." Many books and articles are also available on the topic. As a start, a bibliography with notes is provided below. The links were checked in July 2006. Since these links may change over time, you should download any Web pages you find helpful.

General theory

- How cameras and telescopes work: http://www.howstuffworks.com/ -Search on: Camera & Telescope
- Lens Work, Canon, 1986 edition – Available at: http://www.canonfd.com/lenswork.htm

General macro / micro photography

- Close-up and Macro Photography: http://www.nikonians.org/html/resources/nikon_articles/other/close-up_macro/macro_1.html
- Some concise articles on macrophotography: http://www.macrophotography.org/modules.php?name=Stories_Archive

- Close-up and Macro Photography for Entomologists: http://www.alanwood.net/photography/index.html
- Insect Photography: http://www.richard-seaman.com/Photography/Insects/index.html

Equipment

- Make your own extension tubes or reverse mount for macro – Available at: http://www.jyoseph.com/extras/archives/2006/03/diy_macro_lens.php
- Camera to microscope attachment – homemade with PVC: http://www.barrie-tao.com/microscope_photo.html
- Camera to microscope attachment with macro lens: http://www.scopetronix.com/mvp.htm
- BETZ, V. (2005) "Micromineral Photography with Multifocus Processing," Mineralogical Record, 36, 365–369. (This is a "must-read" if you want to take photos of objects down to 1 millimeter. It is available in the HGMS library.)

Software

- The *Photoshop Elements Book for Digital Photographers*, Scott Kelby, New Riders Publishing, 2004. See Web page: www.scottkelbybooks.com
- Multifocus software (heliconfocus): http://helicon.com.ua/pages/. This software is available for free trial.
- Multifocus software (combinez5): http://www.hadleyweb.pwp.blueyonder.co.uk/CZ5/combinez5.htm. This is freeware with additional information on the HGMS Web page: http://www.hgms.org (click on the green "HGMS News" button, then the red "how2doit" button, and then on "Extended Focus in Macro Photography")